

Implementing New Technologies with Rebuild America

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Mission: To reduce the cost and environmental impact of the nation's building stock by improving energy management decisions, facilitating project development and financing partnerships, and making advanced technologies accessible through applications research

Project Financing

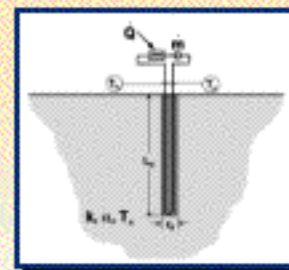
- Financing expertise
- Partnership building
- Project facilitation



Advanced EERE Technologies

- Geothermal Heat Pumps (GHPs)
- Combined Cooling, Heating, and Power (CHP)

Providing ready access for our sponsors' customers through research producing tools that make these technologies as easy to apply as the conventional alternatives



Design/Technical Assistance

- Getting new buildings right the first time
- Achieving best-value renovations
- Helping to apply advanced technologies

FEMP
FEDERAL ENERGY MANAGEMENT PROGRAM

15 researchers

- 8 MS (ME, EE, MBA, Engineering Management)
- 7 BS (ME, Environmental Sciences, Journalism)
- 9 Professional Engineers
- 8 Certified Energy Managers
- 2 LEED-Accredited Professionals

\$4.4M per year budget

- DOE Federal Energy Management Program
- DOE Rebuild America
- DOE Industrial Assessment Centers
- EPA Energy Star Buildings



Facilitated \$45M ESPC financing and \$20M utility financing for federal projects in FY01

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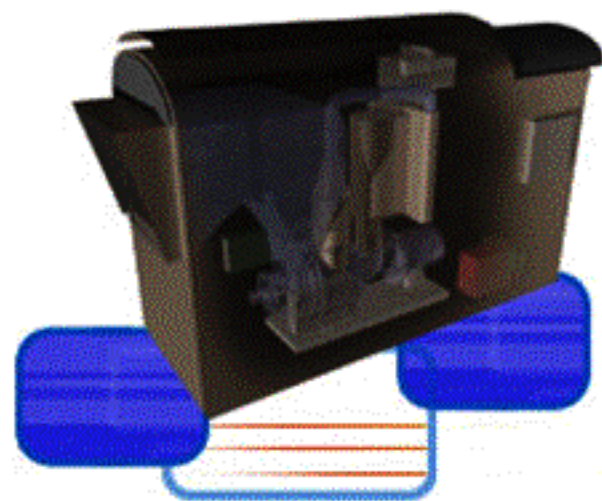
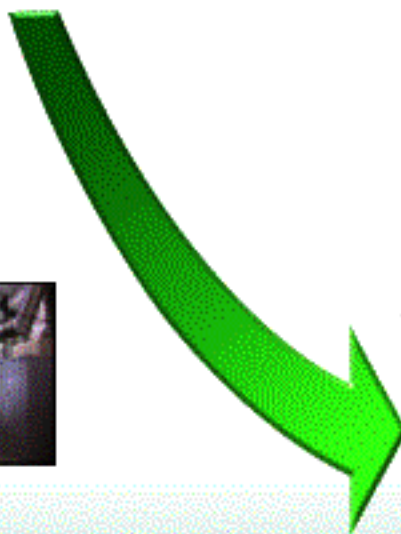
CHP Integration Laboratory – User Center for Industry Partners

- Seven industry teams selected for awards
 - Multiyear DOE/ORNL contracts totaling \$19 million
 - 43% industry cost share (over \$31M total project costs)

Components tested and integrated to optimize packaged energy system

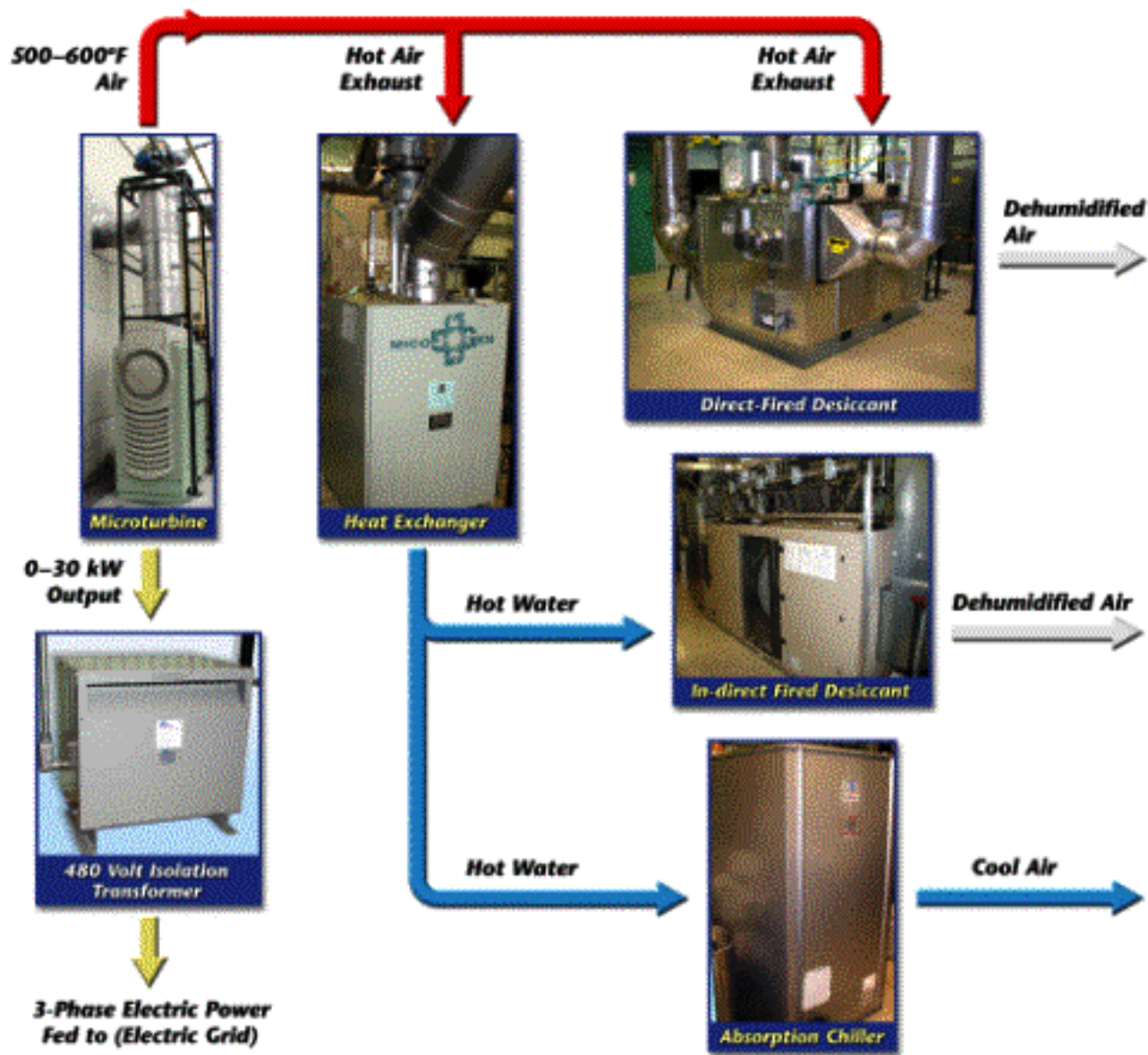
2002:

Individually optimized products
combined on site



2010:

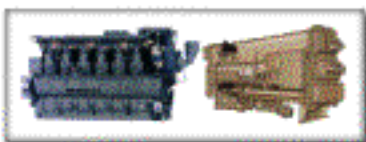
IES - single optimized package
from manufacturer



Burns and McDonnell



Gas Technology Institute



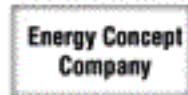
Capstone Turbine Corporation



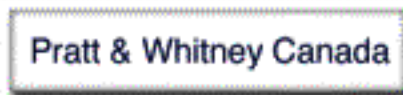
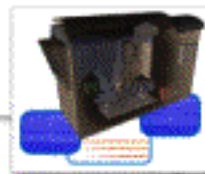
Honeywell Laboratories



Ingersoll Rand



United Technologies Research Center



Goal: make new technologies accessible for Rebuild America partnerships

- **Project facilitation– provide credible “go to” expertise**
- **Leverage what is already being done by FEMP, industry, and EERE**
- **Help solve the need for access to \$ and expertise**
- **Use project experience to advance applications technology**

In 1999, a FEMP Core Team for GHP Technology was formed at ORNL:

- **Provide credible evidence of benefits**
- **Provide guides and training support for the survey/audit stage**
- **Support during project phases**
 - **Feasibility/Decision Stage**
 - **Programming**
 - **Concept**
 - **Design Stage**
 - **Implementation Stage**

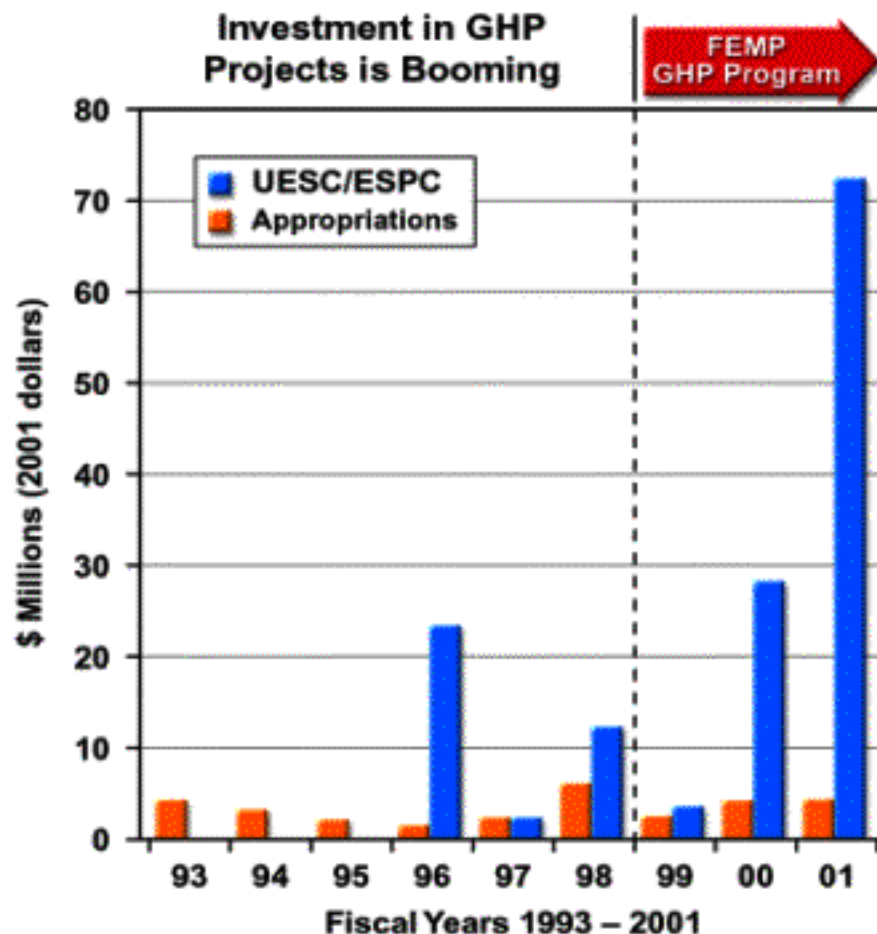
Geothermal Heat Pumps, Continued

- **Design stage**
 - Proven in-situ tests & analysis to determine soil/rock formation thermal properties
 - Proven vertical ground heat exchanger design software
 - Proven borehole completion methods
 - Proven standing column well design tools
 - Proven surface water loop design tools
 - GHP system design guide & training
 - Trained engineers

Geothermal Heat Pumps, Continued

- **Implementation stage**
 - **GHP guide specifications**
 - **GHP system commissioning, preventative maintenance, and trouble-shooting guide**
 - **Trained engineers and contractors**

Federal investment in GHP projects



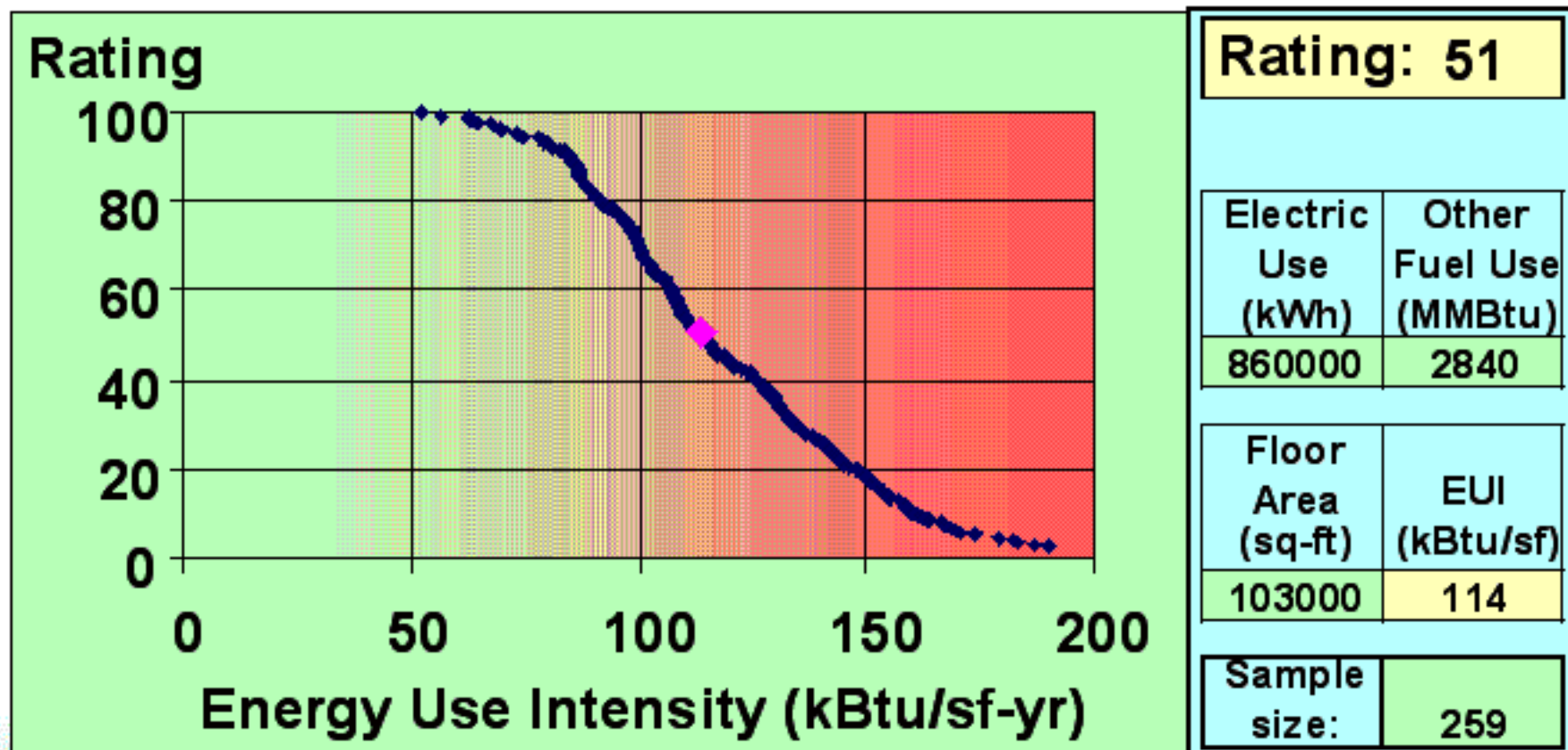
General ORNL Tech Assistance for Projects

- **Response**
 - Response from Lab staff, and
 - Another expert organization, e.g. PECO
 - From a business contact
 - In some instances, from the Strategic Partner network
 - Ability to locate and leverage other resources
- **At any stage of the project process**
 - Programming
 - Concept
 - Design
 - Implementation

Energy Smart Schools

- **Direct technical support to school districts**
- **Develop best practices and case studies**
- **Assist Customer Service reps with partnership development**
- **Present at national conferences (ASBO, CEFPI, NCSL,..)**
- **Assist development of education and training (state level, peer forums, nat'l)**
- **Recruit Strategic Partners and Business Partners**

A Cumulative Distribution Can Serve as a Rating Tool



HUD/DOE Interagency Agreement (IAA)

- **Aimed at Public Housing**
- **\$500k effort for two years implemented through Rebuild America**
- **ORNL "Work for Others" contract vehicle (ORNL, LBNL, Aspen)**
- **Have developed partnerships and projects with almost 30 PHA's**
- **Provide education and training to HUD staff and PHA leaders**
- **Link relevant research and development to HUD housing needs**

Another program resource: Rebuild America Strategic Partners

- **K-12 Schools**
- **Colleges and Universities**
- **Local and State Government**
- **Public and Multifamily Housing**
- **Private Commercial**

Examples of Rebuild America Strategic Partners

- **K-12 Schools**
 - **Ass'n of School Business Officials**
- **Colleges and Universities**
 - **Ass'n of Higher Education Facilities Officers**
- **Local and State Government**
 - **Nat'l Ass'n of State Energy Officials**
- **Public and Multifamily Housing**
 - **Nat'l Ass'n of Housing and Redevelopment Officials**
- **Private Commercial**
 - **Nat'l Main Street Ass'n**